IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors	:	Roberto J. Rioja et al.
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For	:	ALUMINUM-COPPER-MAGNESIUM ALLOYS HAVING ANCILLARY ADDITIONS OF LITHIUM
Examiner	:	Janell Combs Morillo
Art Unit	:	1793

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Commissioner for Patents
P.O. Box 1450
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STATEMENT SHOWING PRIORITY OF PENDING CLAIMS TO PARENT APPLICATION SERIAL NO. 09/104,123 PURSUANT TO 37 CFR 1.73(d)(3)

Dear Sir:

In order to comply with proposed new 37 CFR 1.78(d)(3), Applicants file a Statement Showing Priority Of Pending Claims To Parent Application 09/104,123 ("'123 application"). The instant application is a continuation-in-part of U.S. Patent Application Serial 09/104,123. This Statement is filed in conjunction with a Request for Continued Examination ("RCE"). As detailed below, each of the currently amended and previously presented claims presented in the companion RCE is fully supported by the '123 specification as filed. Thus, each of the currently amended and previously presented claims presented in the companion RCE is entitled to the June 24, 1998 filing date of the '123 application.

I. Listing Of Claims

This Listing of Claims shows all claims submitted in the companion RCE.

Listing of Claims

1. (Currently Amended) An aluminum alloy ~~having good damage tolerance and fatigue crack growth resistance, the alloy~~ comprising:

from about 3 to about 5 weight percent Cu,

from greater than 0.6 to about 2 weight percent Mg,

from about 0.01 to about 0.8 weight percent Li,

up to about 2.0 weight percent Zn,

up to about 2.0 weight percent Ag,

up to about 1 weight percent of a ~~grain refiner~~ dispersoid, and

the balance aluminum and incidental elements and impurities, ~~wherein the Cu and Mg are present in a controlled amount in the alloy such that they are present in a total amount below the solubility limit of the alloy and the strength/toughness relationship is positive for lithium addition to a given alloy.~~

Wherein the amount of Cu in the alloy is below the maximum solubility;

Wherein the amount of Mg in the alloy is below the maximum solubility;

Wherein the fracture toughness of the alloy is maintained or improved upon addition of lithium when compared to the same alloy having the same composition but having no lithium component; and

Wherein the strength of the alloy is improved upon addition of lithium when compared to the same alloy having the same composition but having no lithium component.

2. (Previously Presented) The aluminum alloy of Claim 1, wherein the Li content of the alloy is from about 0.2 to about 0.8 weight percent.

3. (Previously Presented) The aluminum alloy of Claim 1, wherein the Li content of the alloy is from about 0.2 to about 0.7 weight percent.

4. (Previously Presented) The aluminum alloy of Claim 1, wherein the Cu content of the alloy is from about 3.5 to about 4.5 weight percent.

5. (Previously Presented) The aluminum alloy of Claim 1, wherein the Cu content of the alloy is from about 3.6 to about 4.4 weight percent.

6. (Currently Amended) The aluminum alloy of Claim 1, wherein the Mg content of the alloy is from about 0.6 to about ~~3..5~~ 1.5 weight percent.

7. (Previously Presented) The aluminum alloy of Claim 1, wherein the Mg content of the alloy is from about 0.7 to about 1.0 weight percent.

8. (Previously Presented) The aluminum alloy of Claim 1, wherein the Cu and Mg contents of the alloy conform to the formula:

$Cu \leq 2-0.676\ (Mg - 6)$.

9. (Previously Presented) The aluminum alloy of Claim 1, wherein the Cu and Mg contents of the alloy conform to the formula:

$Cu \leq 1.5-0.556\ (Mg- 6)$.

10. (Previously Presented) The aluminum alloy of Claim 1, wherein the silver content of the alloy is from about 0.01 to about 2 weight percent.

11. (Previously Presented) The aluminum alloy of Claim 10, wherein the Ag content of the alloy is from about. 0.05 to about 0.5 weight percent.

12. (Previously Presented) The aluminum alloy of Claim 10, wherein the Ag content of the alloy is from about 0.1 to about 0.4 weight percent.

13. (Previously Presented) The aluminum alloy of Claim 1, wherein the zinc content of the alloy is from about 0.05 to about 2 weight percent.

14. (Previously Presented) The aluminum alloy of Claim 13, wherein the Zn content of the alloy is from about 0.2 to about 1 weight percent.

15. (Previously Presented) The aluminum alloy of Claim 13, wherein the Zn content of the alloy is about 0.5 weight percent.

16. (Previously Presented) The aluminum alloy of Claim 1, further comprising from about 0.1 to about 2 weight percent Si.

17. (Previously Presented) The aluminum alloy of Claim 16, wherein said Si content is from about 0.1 to about 2 weight percent Si.

18. (Currently Amended) The aluminum alloy of Claim 1, ~~the alloy further comprising at least one dispersoid-forming element selected from~~ wherein said dispersoid is

selected from at least one of the group consisting of chromium, vanadium, titanium, zirconium, manganese, nickel, iron, hafnium, scandium and rare earth elements.

19. (Currently Amended) The aluminum alloy of Claim 18, wherein the at least one dispersoid~~-forming element~~ in the alloy is present in a total amount up to about 1.0 weight percent of the alloy.

20. (Previously Presented) The aluminum alloy of Claim 1, the alloy further comprising from about 0.2 to about 0.7 weight percent Mn.

21. (Previously Presented) The aluminum alloy of Claim 1, wherein the aluminum alloy is in the form of a sheet.

22. (Previously Presented) The aluminum alloy of Claim 1, wherein the aluminum alloy is in the form of a plate.

23. (Previously Presented) The aluminum alloy of Claim 1, wherein the aluminum alloy is in the form of an extrusion.

24. (Previously Presented) The aluminum alloy of Claim 1, wherein the aluminum alloy is in the form of a forging.

25. (Withdrawn) An aluminum-copper-magnesium alloy aircraft product having an ancillary addition of lithium, the alloy product consisting essentially of:

3.0 to 5.0 wt.% Cu;

0.7 to 2 wt. % Mg,

0.01 to 0.8 wt.% Li,

a maximum of about 2 wt.% Si,

a maximum of about 2 wt.% Zn,

a maximum of about 2 wt.% Ag, and

at least one dispersoid-forming element selected from the group consisting of chromium, vanadium, titanium, zirconium, manganese, nickel, iron, hafnium, scandium and rare earth elements,

wherein said alloy, exhibits an improved fatigue crack growth resistance such that when aged to a T3 condition and tested per ASTM E647-95a in air (having about 90% relative humidity at room temperature~~)~~, with ΔK equal to 10 ks√in, the alloy exhibits an increase of at least about 27% relative to a comparable lithium free alloy; and wherein the strength toughness relationship is positive for the lithium addition to a given alloy.

26. (Currently Amended) An alloy product for use in aerospace damage tolerant aircraft parts having improved fatigue crack growth resistance, said alloy product consisting essentially of:

3.0 to 5.0 wt.% Cu;
0.7 to 2 wt.% Mg,
up to 2.0 wt.% Si,
up to 2.0 wt.% Zn,
up to 2.0 wt.% Ag, and
0.01 to 0.8 wt.% Li,

wherein said damage tolerant aircraft part is a fuselage panel or frame component, wing skin, rib, spar landing gear component, wheel, horizontal stabilizer, vertical stabilizer, pressure bulkhead, door frame, window frame, or wheel component ; ~~and~~

~~the strength toughness relationship is positive for the lithium addition to a given alloy.~~

Wherein the fracture toughness of the alloy is maintained or improved upon addition of lithium when compared to the same alloy having the same composition but having no lithium component; and

Wherein the strength of the alloy is improved upon addition of lithium when compared to the same alloy having the same composition but having no lithium component.

II. Support For Claims 1-24 and 26 Filed In The Companion RCE

Support for the following limitations of Claims 1-24 and 26 (as presented in the companion RCE) is present in the specification of the '123 application as filed and as demonstrated below:

Claim 1

- Support for the limitation "from about 3 to about 5 weight percent Cu" is found, for example, at page 2, line 27 of the '123 specification as filed.
- Support for the limitation "from greater than 0.6 to about 2 weight percent Mg" is found, for example, at page 2, line 28 of the '123 specification as filed.
- Support for the limitation "from about 0.01 to about 0.8 weight percent Li"is found, for example, at page 2, lines 28 - 29 of the specification as filed.
- Support for the limitation "up to about 2.0 weight percent Zn" is found, for example, at page 5, lines 23-25 of the '123 specification as filed.
- Support for the limitation "up to about 2.0 weight percent Ag" is found, for example, at page 5, lines 23-24 of the '123 specification as filed.
- Support for the limitation "up to about 1 weight percent of a dispersoid" is found, for example, at page 5, lines 18-23 of the '123 specification as filed. "Dispersoid" is synonymous with "grain refiner", as those terms are commonly used and are used in the '123 specification and instant application.
- Support for the limitation "the balance aluminum and incidental elements and impurities" is found, for example, at page 5, lines 14-16 of the '123 specification as filed.
- Support for the limitation "wherein the amount of Cu in the alloy is below the maximum solubility" is found, for example, at page 5, lines 25 - 35 of the '123 specification as filed.
- Support for the limitation "wherein the amount of Mg in the alloy is below the maximum solubility" is found, for example, at page 5, lines 25-35 of the '123 specification as filed.
- Support for the limitation "wherein the fracture toughness of the alloy is maintained or improved upon addition of lithium when compared to the same alloy having the same composition but having no lithium component" is found,

for example, at page 13, line 16 - page 14, line 2 of the '123 specification as filed. "Fracture Toughness" is defined as the R-curve and discrete measures of fracture toughness obtained therefrom such as K_{R25} and is tested per ASTM E 561-94 "Standard Practice for R-Curve Determination" as supplemented by ASTM B 646-94.

- Support for the limitation "wherein the strength of the alloy is improved upon addition of lithium when compared to the same alloy having the same composition but having no lithium component" is found, for example, at page 13, line 16 - page 14, line 2 of the '123 specification as filed. "Strength" is defined as tensile yield strength and is tested per ASTM E 8 - 96 "Standard Test Methods for Tension Testing of Metallic Materials".

Claim 2

- Support for the limitation "wherein the Li content of the alloy is from about 0.2 to about 0.8 weight percent" is found, for example, as described relative to claim 1 above.

Claim 3

- Support for the limitation "wherein the Li content of the alloy is from about 0.2 to about 0.7 weight percent" is found, for example, as described relative to claim 1 above.

Claim 4

- Support for the limitation "wherein the Cu content of the alloy is from about 3.5 to about 4.5 weight percent" is found, for example, as described relative to claim 1 above.

Claim 5

- Support for the limitation "wherein the Cu content of the alloy is from about 3.6 to about 4.4 weight percent" is found, for example, as described relative to claim 1 above.

Claim 6

- Support for the limitation "wherein the Mg content of the alloy is from about 0.6 to about 1.5 weight percent" is found, for example, as described relative to claim 1 above.

Claim 7

- Support for the limitation "wherein the Mg content of the alloy is from about 0.7 to about 1.0 weight percent" is found, for example, as described relative to claim 1 above.

Claim 8

- Support for the limitation "wherein the Cu and Mg contents of the alloy conform to the formula: $Cu \leq 2-0.676\ (Mg - 6)$" is found, for example, at the equation of page 8, line 31 of the '123 specification as filed.

Claim 9

- Support for the limitation "wherein the Cu and Mg contents of the alloy conform to the formula: $Cu \leq 1.5-0.556\ (Mg - 6)$" is found, for example, at the equation of page 9, line 3 of the '123 specification as filed.

Claim 10

- Support for the limitation "wherein the silver content of the alloy is from about 0.01 to about 2 weight percent" is found, for example, as described relative to claim 1 above.

Claim 11

- Support for the limitation "wherein the Ag content of the alloy is from about 0.05 to about 5 weight percent" is found, for example, as described relative to claim 1 above.

Claim 12

- Support for the limitation "wherein the Ag content of the alloy is from about 0.1 to about 0.4 weight percent" is found, for example, as described relative to claim 1 above.

Claim 13

- Support for the limitation "wherein the zinc content of the alloy is from about 0.05 to about 0.2 weight percent" is found, for example, as described relative to claim 1 above.

Claim 14

- Support for the limitation "wherein the Zn content of the alloy is from about 0.2 to about 1 weight percent" is found, for example, as described relative to claim 1 above.

Claim 15

- Support for the limitation "wherein the Zn content of the alloy is about 0.5 weight percent" is found, for example, as described relative to claim 1 above.

Claim 16

- Support for the limitation "further comprising from about 0.1 to about 2 weight percent Si" is found, for example, at page 5, lines 23-25 of the '123 specification as filed.

Claim 17

- Support for the limitation "wherein said Si content is from about 0.1 to about 2 weight percent Si" is found, for example, at page 5, lines 23-25 of the '123 specification as filed.

Claim 18

- Support for the limitation "wherein said dispersoid is selected from at least one of the group consisting of chromium, vanadium, titanium, zirconium, manganese, nickel, iron, hafnium, scandium and rare earth elements" is found, for example, at page 5, lines 17-23 of the '123 application as filed. "Dispersoid" is synonymous with "grain refiner", as those terms are commonly used and are used in the '123 specification and instant application.

Claim 19

- Support for the limitation "wherein the at least one dispersoid in the alloy is present in a total amount up to about 1.0 weight percent of the alloy" is found, for example, at page 5, lines 17-24 of the '123 application as filed. "Dispersoid" is synonymous with "dispersoid-forming element" as those terms are used in the '123 specification and instant application.

Claim 20

- Support for the limitation "the alloy further comprising from about 0.2 to about 0.7 weight percent Mn" is found, for example, at page 5, lines 17-23 of the '123 specification as filed.

Claim 21

- Support for the limitation "the aluminum alloy is in the form of a sheet" is found, for example, at page 4, lines 16-25 of the '123 specification as filed.

Claim 22

- Support for the limitation "wherein the aluminum alloy is in the form of a plate" is found, for example, at page 10, lines 28-30 of the specification as filed.

Claim 23

- Support for the limitation "wherein the aluminum alloy is in the form of an extrusion" is found, for example, at page 4, lines 16-25 of the '123 specification as filed.

Claim 24

- Support for the limitation "wherein the aluminum alloy is in the form of a forging" is found, for example, at page 9, lines 9-10 of the '121 specification as filed

Claim 26

- Support for the limitation "wherein said damage tolerant aircraft part is a fuselage panel or frame component, wing skin, rib, spar landing gear component, wheel, horizontal stabilizer, vertical stabilizer, pressure bulkhead, door frame, window frame, or wheel component" is found, for example, at page 5, lines 2-3 of the '123 specification as filed.
- Support for the remaining limitations of Claim 26 are found, for example, as described relative to Claim 1 above.

Respectfully submitted,

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